Replacement Sheet
Sheet 1 of 30
Appl. No. 09/973,872; Filed: Oct 11, 2001
Dkt No. 1875.0670001; Group Unit: 2662
Inventors: BUNN et al.
Tel. No.: 202-371-2600 For: Efficiently Transmitting RTP Protocol In A Network That Guarantees In Order Delivery Of Packets USER DEVICE USER DEVICE DOCSIS CM 중 CMTS PACKET SWITCHED NETWORK

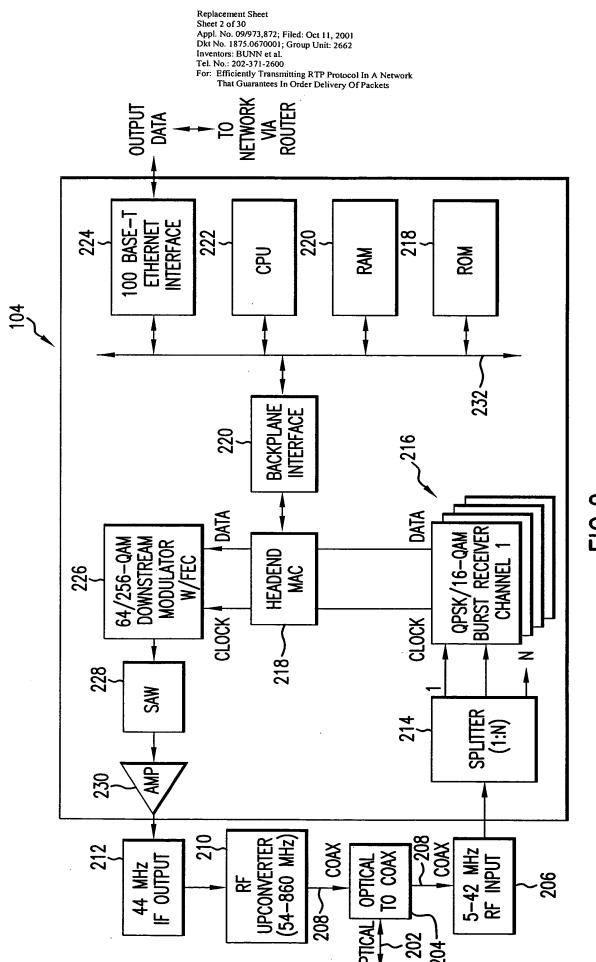
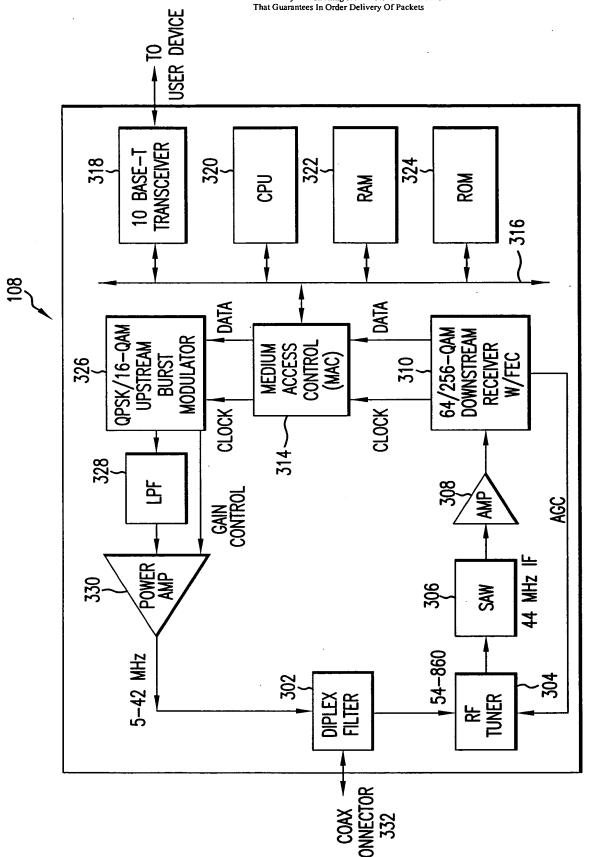


FIG.2

Replacement Sheet Sheet 3 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al. Tel. No.: 202-371-2600



F16.3

Replacement Sheet Sheet 4 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Inventors: BUNN et al. Tel. No.: 202-371-2600

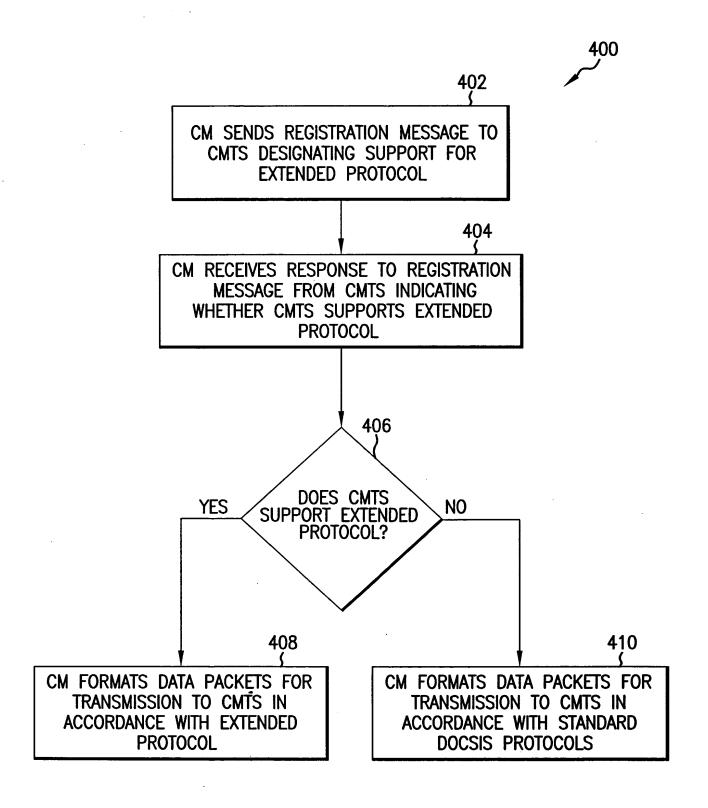


FIG.4

Replacement Sheet Sheet 5 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Inventors: BUNN et al. Tel. No.: 202-371-2600

For: Efficiently Transmitting RTP Protocol In A Network

500

That Guarantees In Order Delivery Of Packets

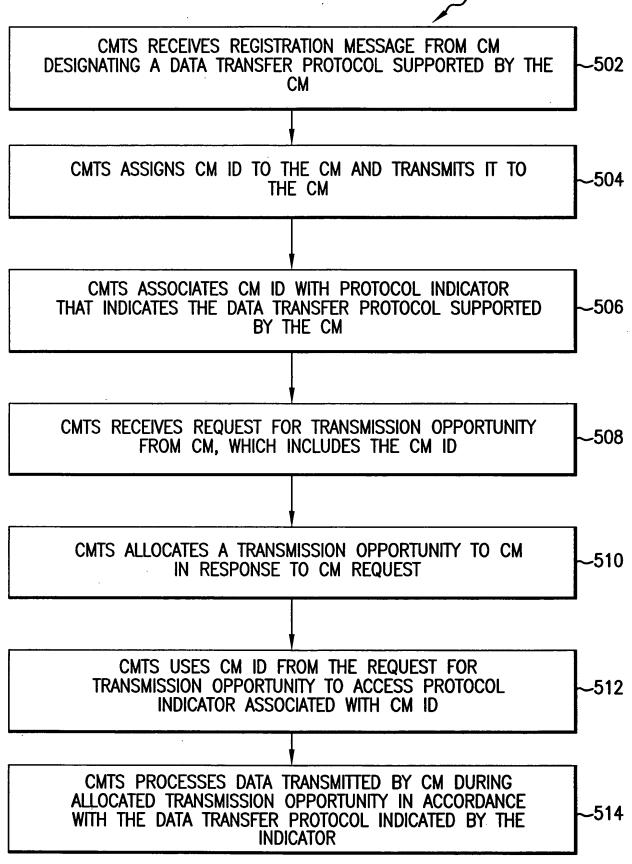
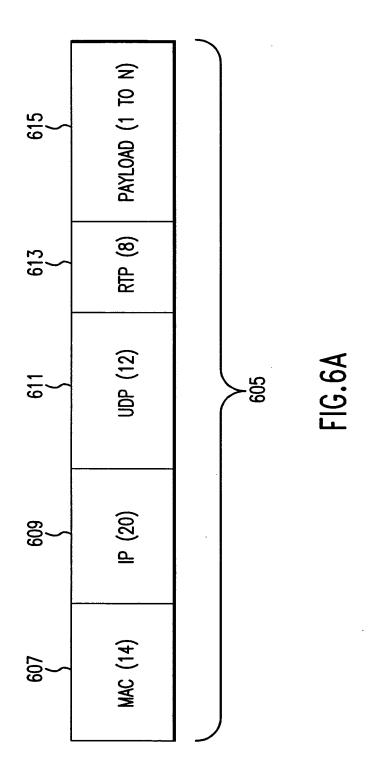


FIG.5

Replacement Sheet Sheet 6 of 30

Sheet 6 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al. Tel. No.: 202-371-2600



Replacement Sheet
Sheet 7 of 30
Appl. No. 09/973,872; Filed: Oct 11, 2001
Dkt No. 1875.0670001; Group Unit: 2662
Inventors: BUNN et al.
Tel. No.: 202-371-2600

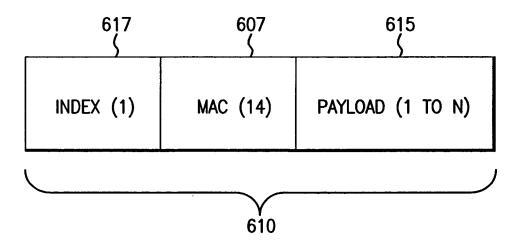


FIG.6B

Replacement Sheet Sheet 8 of 30 Sneet 8 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al. Tel. No.: 202-371-2600

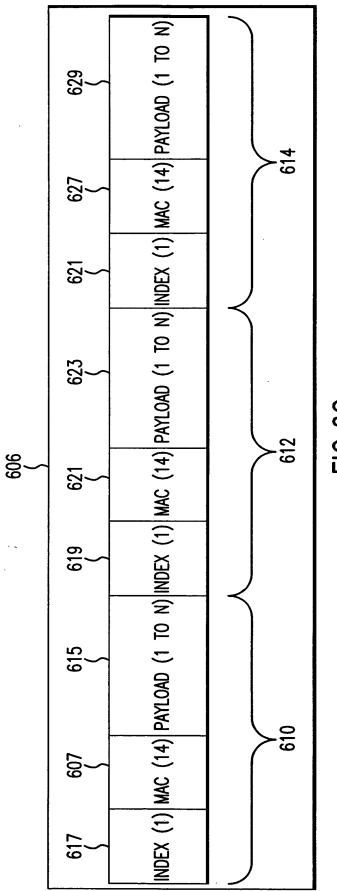


FIG.6C

Replacement Sheet Sheet 9 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al. Tel. No.: 202-371-2600

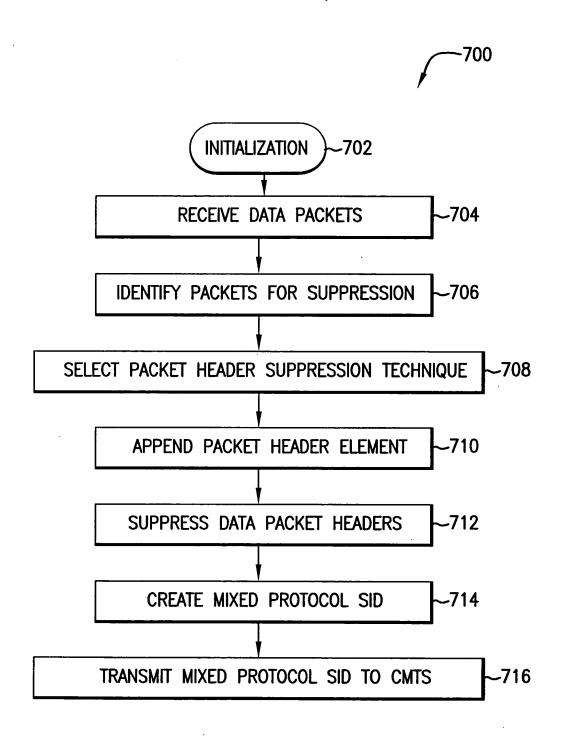


FIG.7

Replacement Sheet Sheet 10 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al.

Tel. No.: 202-371-2600

For: Efficiently Transmitting RTP Protocol In A Network
That Guarantees In Order Delivery Of Packets

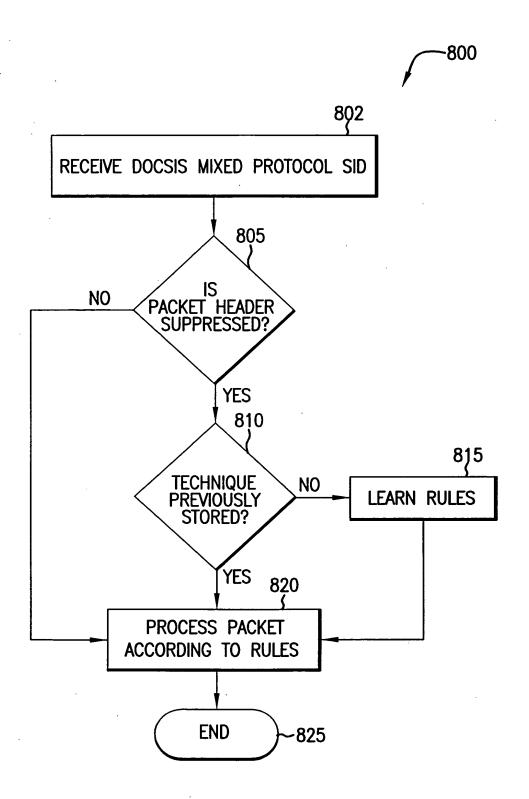


FIG.8

Replacement Sheet
Sheet 11 of 30
Appl. No. 09/973,872; Filed: Oct 11, 2001
Dkt No. 1875.0670001; Group Unit: 2662
Inventors: BUNN et al.
Tel. No.: 202-371-2600



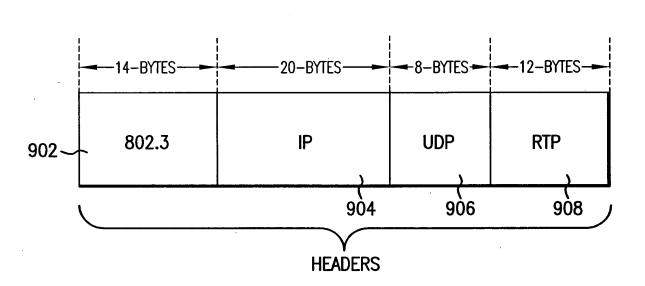


FIG.9A

Replacement Sheet

Sheet 12 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Inventors: BUNN et al.

Tel. No.: 202-371-2600
For: Efficiently Transmitting RTP Protocol In A Network That Guarantees In Order Delivery Of Packets

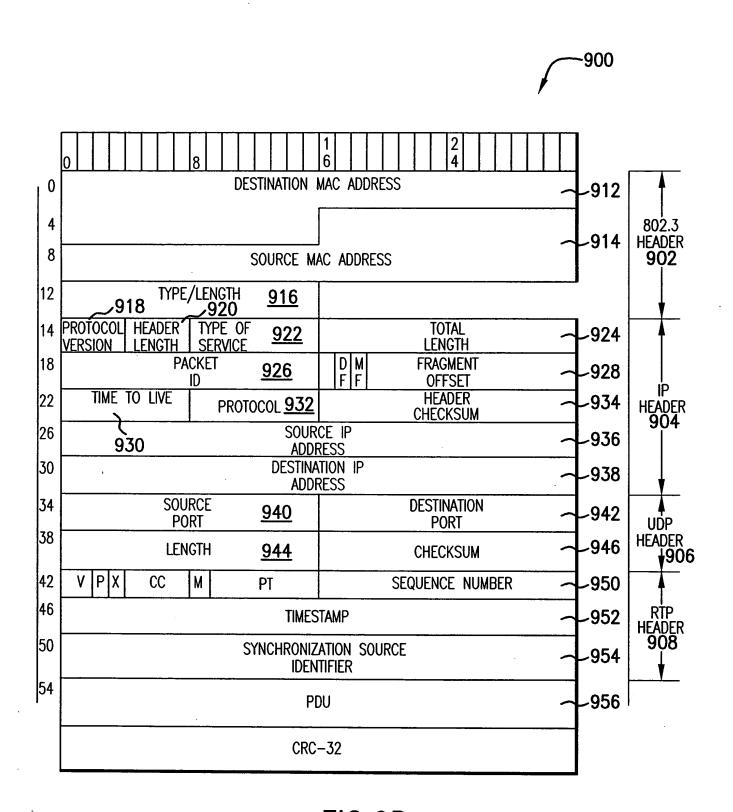
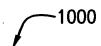


FIG.9B

Replacement Sheet Sheet 13 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al. Tel. No.: 202-371-2600



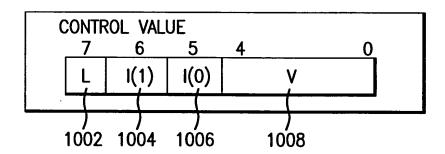


FIG.10

Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al. Tel. No.: 202-371-2600 For: Efficiently Transmitting RTP Protocol In A Network That Guarantees In Order Delivery Of Packets 1100 **START** -1102 1104 COMMUNICATE TO RECEIVER INFORMATION CONCERNING RTP HEADER SUPPRESSION TO ENABLE RECONSTRUCTION OF PACKETS AT THE RECEIVER 1106 SEND A COMPLETE PACKET TO THE RECEIVER FOR LEARNING THE HEADER 1108 HAS NO RECEIVER **LEARNED HEADER** YES 1110 SEND SUBSEQUENT PACKETS IN RTP STREAM USING SUPPRESSION TECHNIQUES 1112 HAVE **ALL RTP** NO **PACKETS** BEEN SENT YES **FIG.11 END** 1114

Replacement Sheet Sheet 14 of 30

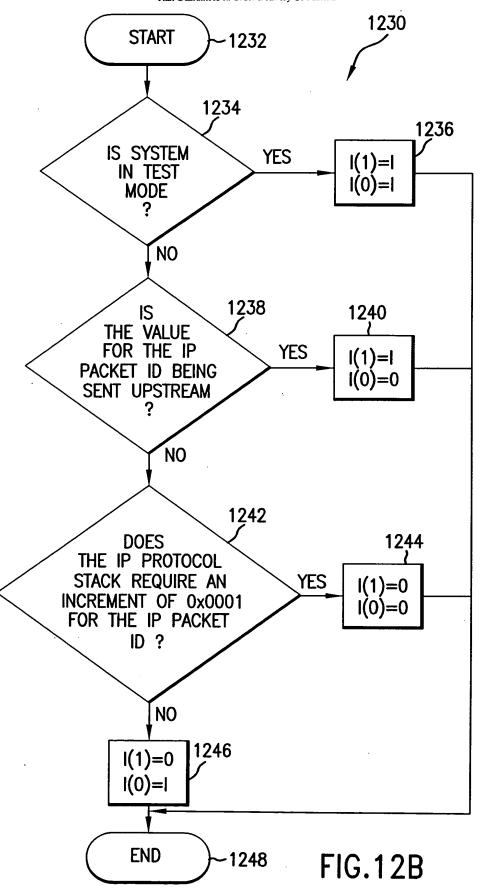
Appl. No. 09/973,872; Filed: Oct 11, 2001

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al. Tel. No.: 202-371-2600 For: Efficiently Transmitting RTP Protocol In A Network That Guarantees In Order Delivery Of Packets 1200 START RTP -1202 **SUPPRESSOR** 1204 DETERMINE DELTA VALUE FOR RTP TIMESTAMP 1206 DETERMINE DELTA VALUE FOR SEQUENCE NUMBER 1220 1208 1210 SET CONTROL BITS I(1) AND I(0) HAS PROPER **YES** NO CONTROL (L)=1 FOR PROPER INCREMENT RECONSTRUCTION OCCURRED VALUE AND SET 1212 TEMP (1)=CONTROL VALUE TEMP (1)=CONTROL VALUE 1222 1214 COPY 2 BYTES FROM TEMP TO ALLOCATE NEW BUFFER ORIGINAL BUFFER [52] AND STORE TEMP VALUES IN BUFFER 1224 1216 TRANSMIT NEW TRANSMIT ORIGINAL **BUFFER AND** LENGTH-52 BYTES ORIGINAL BUFFER FROM OFFSET 52 TO RECEIVER **END** -1218 FIG. 12A

Replacement Sheet Sheet 15 of 30 Replacement Sheet Sheet 16 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Inventors: BUNN et al. Tel. No.: 202-371-2600

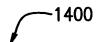


Inventors: BUNN et al. Tel. No.: 202-371-2600 For: Efficiently Transmitting RTP Protocol In A Network That Guarantees In Order Delivery Of Packets START RTP DELTA 1302 RECONSTRUCTOR READ 1-BYTE FROM INPUT STREAM AND -1300 PLACE IN LOW-ORDER BYTE OF DELTA 1304 **READ 54 BYTES** 1322 1320 FROM INPUT STREAM 1306 NO YES CONTROL(I1)=1 1330 READ 1-BYTE 1324 CONTROL VALUE FROM NO 1332 INPUT STREAM **€**ONTROL(I₀)= NO YES CONTROL(I₀)= 1308 READ 2-BYTES 1328 YES 1326 (AS WORD) FROM NO CONTROL(L)=1 INPUT STREAM SET INCR=0x0100 AND PLACE IN SET INCR=0x0001 WORD FIELD AT OFFSET 18 (IP ID) YES 1310 READ AND DISCARD 1334 1-BYTE FROM INPUT STREAM YES BITS[4-0] OF BYTE 1312 AT OFFSET 45= CTL[V]? DISCARD CURRENT 54 1336 NO **BYTES** 1314 ADD 1 TO WORD AT OFFSET 44 **READ 54 BYTES** [RTP_SEQ#] 1342 FROM INPUT STREAM 1338 CALCULATE NEW IP HEADER CHECKSUM AND PLACE IN ADD INCR TO WORD AT OFFSET WORD AT OFFSET 24 (IP HDR CHECKSUM) (SEE TCP 18 [IP ID] RECONSTRUCTOR FOR DETAILS' 1340 1316 ADD DELTA TO LWORD AT OFFSET 46 [RTP_TIMESTAMP] COPY 54 BYTES TO TEMPLATE HEADER CONTROL VALUE AND EMIT 6 4 0 ٧ END RTP DELTA -1318 RECONSTRUCTOR IN THE FLOWCHART: BYTE INDICATES AN 8-BIT UNSIGNED VALUE WORD INDICATES A 16-BIT UNSIGNED VALUE **FIG.13** LWORD INDICATES A 32-BIT UNSIGNED VALUE

Replacement Sheet Sheet 17 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Replacement Sheet
Sheet 18 of 30
Appl. No. 09/973,872; Filed: Oct 11, 2001
Dkt No. 1875.0670001; Group Unit: 2662
Inventors: BUNN et al.
Tel. No.: 202-371-2600
For: Efficiently Transmitting RTP Protocol In A Network
That Guarantees In Order Delivery Of Packets



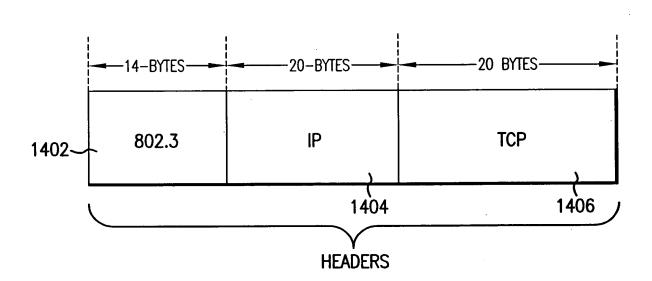


FIG.14A

Replacement Sheet Sheet 19 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Inventors: BUNN et al. Tel. No.: 202-371-2600

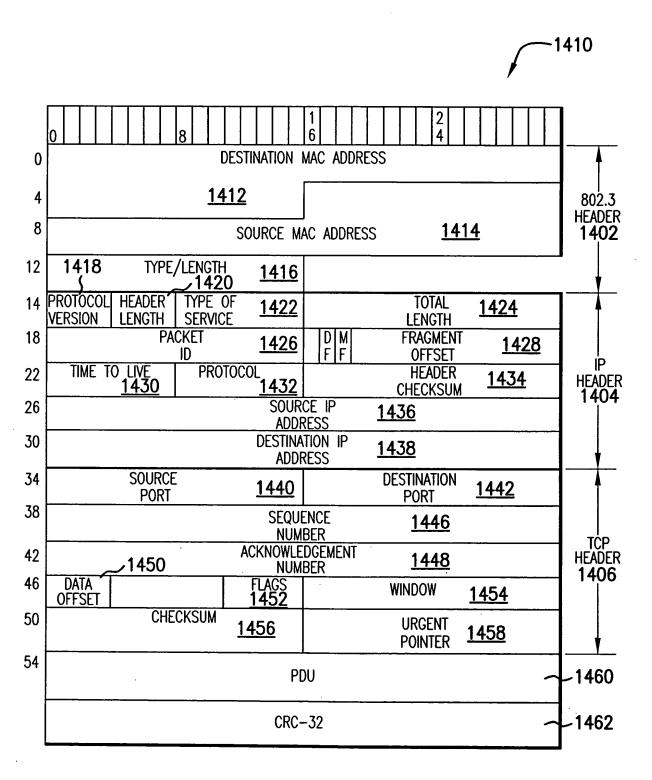


FIG.14B

Replacement Sheet Sheet 20 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et ai.

Tel. No.: 202-371-2600

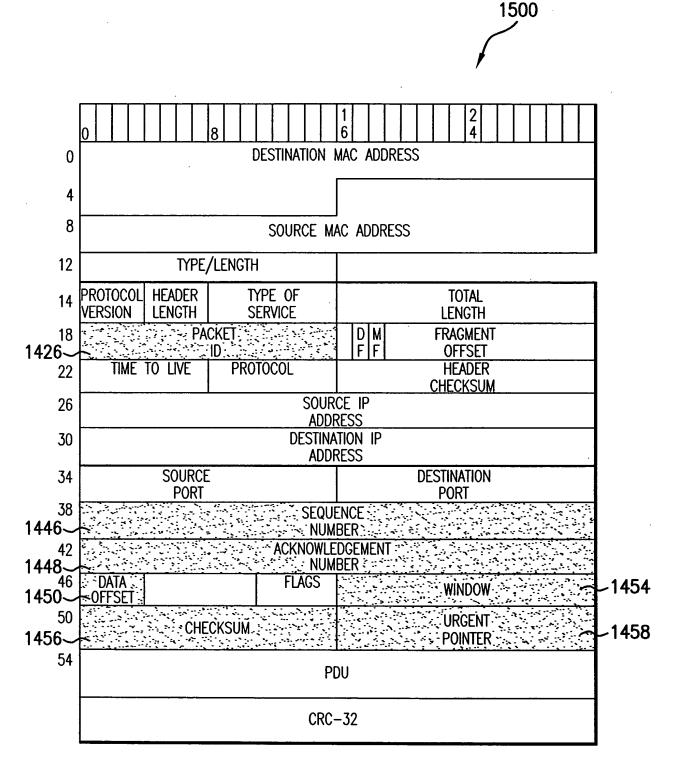


FIG.15

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al. Tel. No.: 202-371-2600 For: Efficiently Transmitting RTP Protocol In A Network That Guarantees In Order Delivery Of Packets 1600 START -1601 INFORMATION CONCERNING TCP DELTA-ENCODED 1602 HEADER SUPPRESSION IS COMMUNICATED TO A RECEIVER AN INDIVIDUAL TCP CONNECTION STREAM 1603 IS IDENTIFIED A FIRST TCP PROTOCOL PACKET IN A TCP CONNECTION STREAM IS TRANSMITTED 1604 IN ITS ENTIRETY W/AN INDICATOR SET TO LEARN -1606 RETRIEVE NEXT PACKET IN TCP CONNECTION STREAM IDENTIFY CHANGED FIELDS DETERMINE 1608 DELTA-ENCODED VALUES FOR CHANGED FIELDS GENERATE A BIT MAPPED FLAG -1610 GENERATE A COMPRESSED TCP -1612 PROTOCOL PACKET AND APPEND TO BIT MAPPED FLAG TRANSMIT COMPRESSED TCP 1614 PROTOCOL PACKET ARE THERE MORE NO YES TCP PACKETS IN CONNECTION STREAM FIG. 16A

Replacement Sheet Sheet 21 of 30 Replacement Sheet Sheet 22 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Inventors: BUNN et al. Tel. No.: 202-371-2600

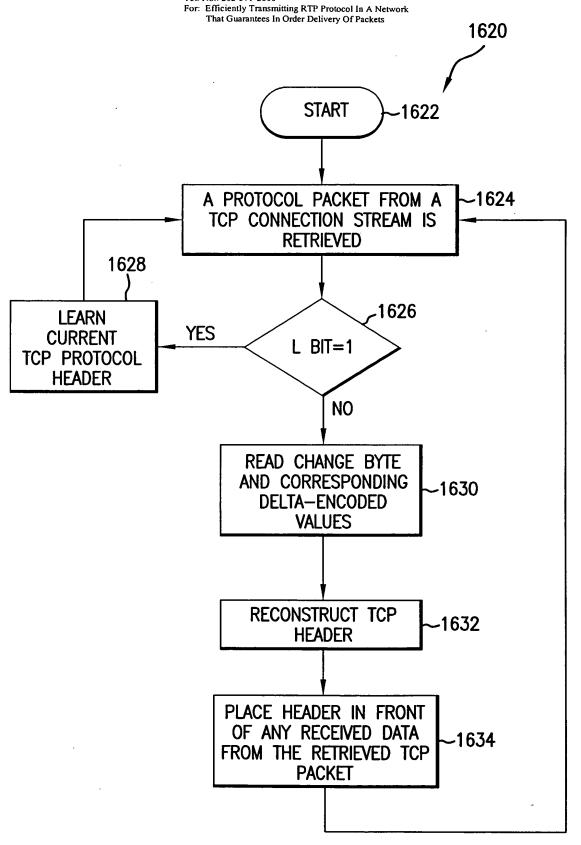


FIG.16B

Replacement Sheet Sheet 23 of 30

Sheet 23 of 30
Appl. No. 09/973,872; Filed: Oct 11, 2001
Dkt No. 1875.0670001; Group Unit: 2662
Inventors: BUNN et al.
Tel. No.: 202-371-2600
For: Efficiently Transmitting RTP Protocol In A Network
That Guarantees In Order Delivery Of Packets



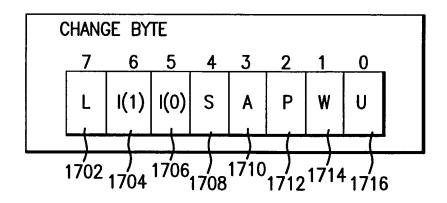


FIG.17

FIG.18

1800

Replacement Sheet Sheet 25 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inveniors: BUNN et al. Tel. No.: 202-371-2600

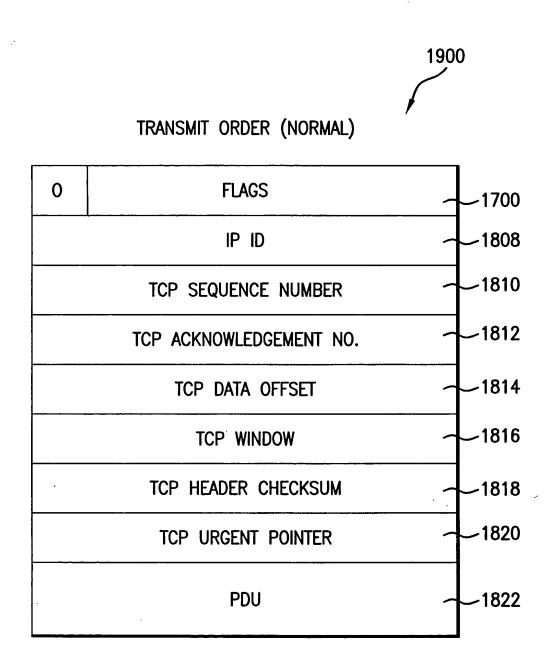


FIG.19

Replacement Sheet Sheet 26 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al.

Tel. No.: 202-371-2600

For: Efficiently Transmitting RTP Protocol In A Network
That Guarantees In Order Delivery Of Packets



TRANSMIT ORDER (LEARN)

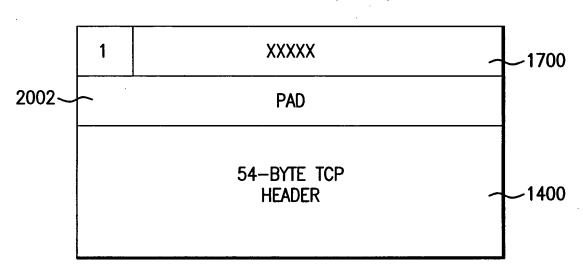


FIG.20

Replacement Sheet
Sheet 27 of 30
Appl. No. 09/973,872; Filed: Oct 11, 2001
Dkt No. 1875.0670001; Group Unit: 2662
Inventors: BUNN et al.
Tel. No.: 202-371-2600
For: Efficiently Transmitting RTP Protocol In A Network

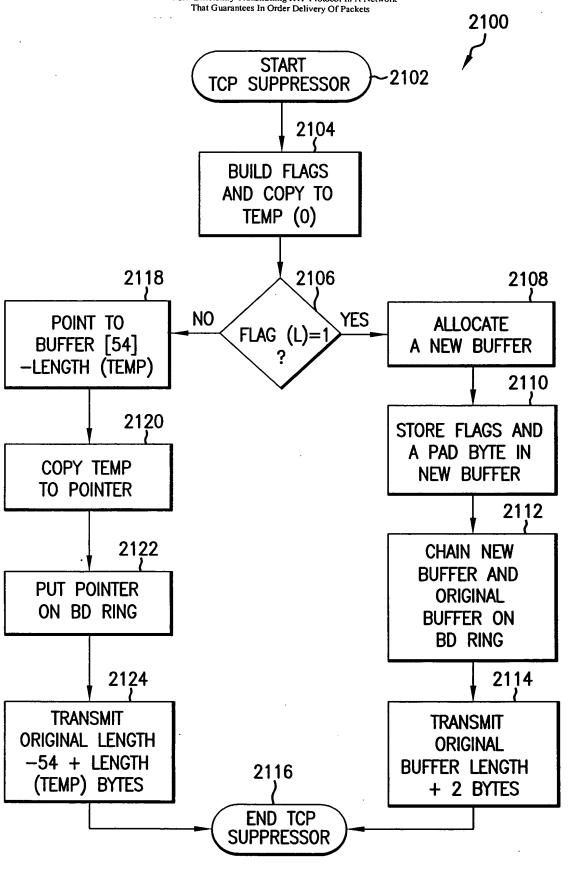


FIG.21

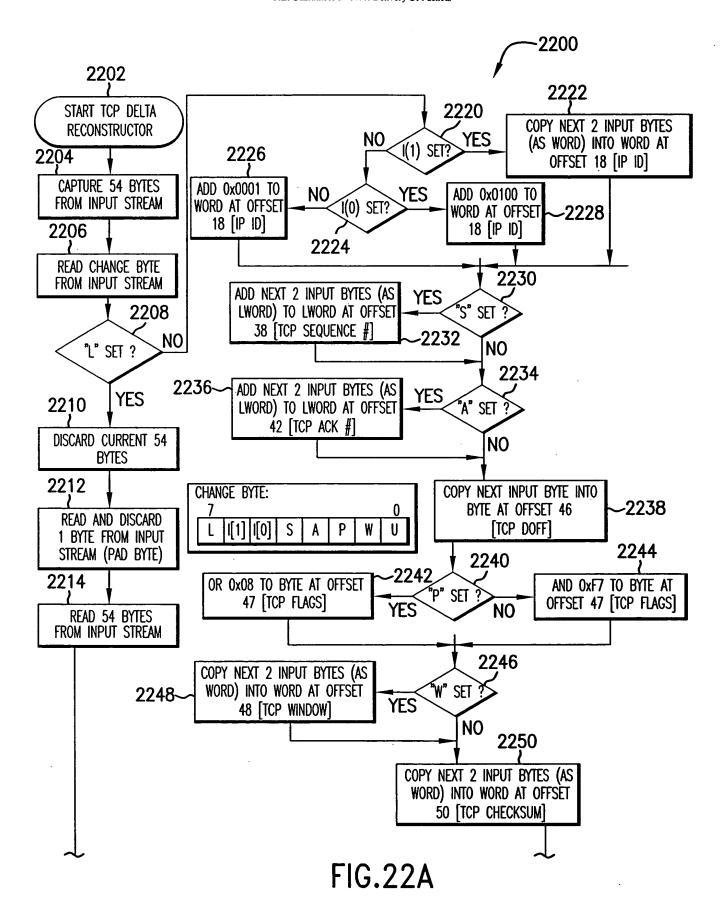
Replacement Sheet

Sheet 28 of 30

Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Inventors: BUNN et al.

Tel. No.: 202-371-2600



Replacement Sheet Sheet 29 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662

Inventors: BUNN et al. Tel. No.: 202-371-2600

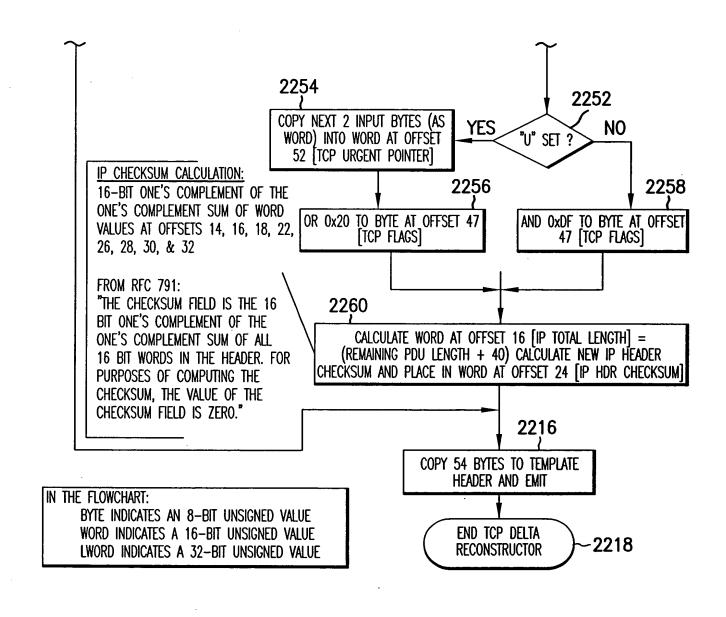


FIG.22B

Replacement Sheet Sheet 30 of 30 Appl. No. 09/973,872; Filed: Oct 11, 2001 Dkt No. 1875.0670001; Group Unit: 2662 Inventors: BUNN et al.

Tel. No.: 202-371-2600 For: Efficiently Transmitting RTP Protocol In A Network

